
FEDERAL - STATE COOPERATIVE

SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for

# Arizona

By

Division of Irrigation, Soil Conservation Service

United States Department of Agriculture



As of

FEB. 15, 1951

Data included in this report were obtained by the agency named above in cooperation with the Federal, State and local organizations listed on the last page of this report.

# FEDERAL-STATE COOPERATIVE

# SNOW SURVEYS AND IRRIGATION WATER FORECASTS

# FOR

# ARIZONA

Report Prepared

by

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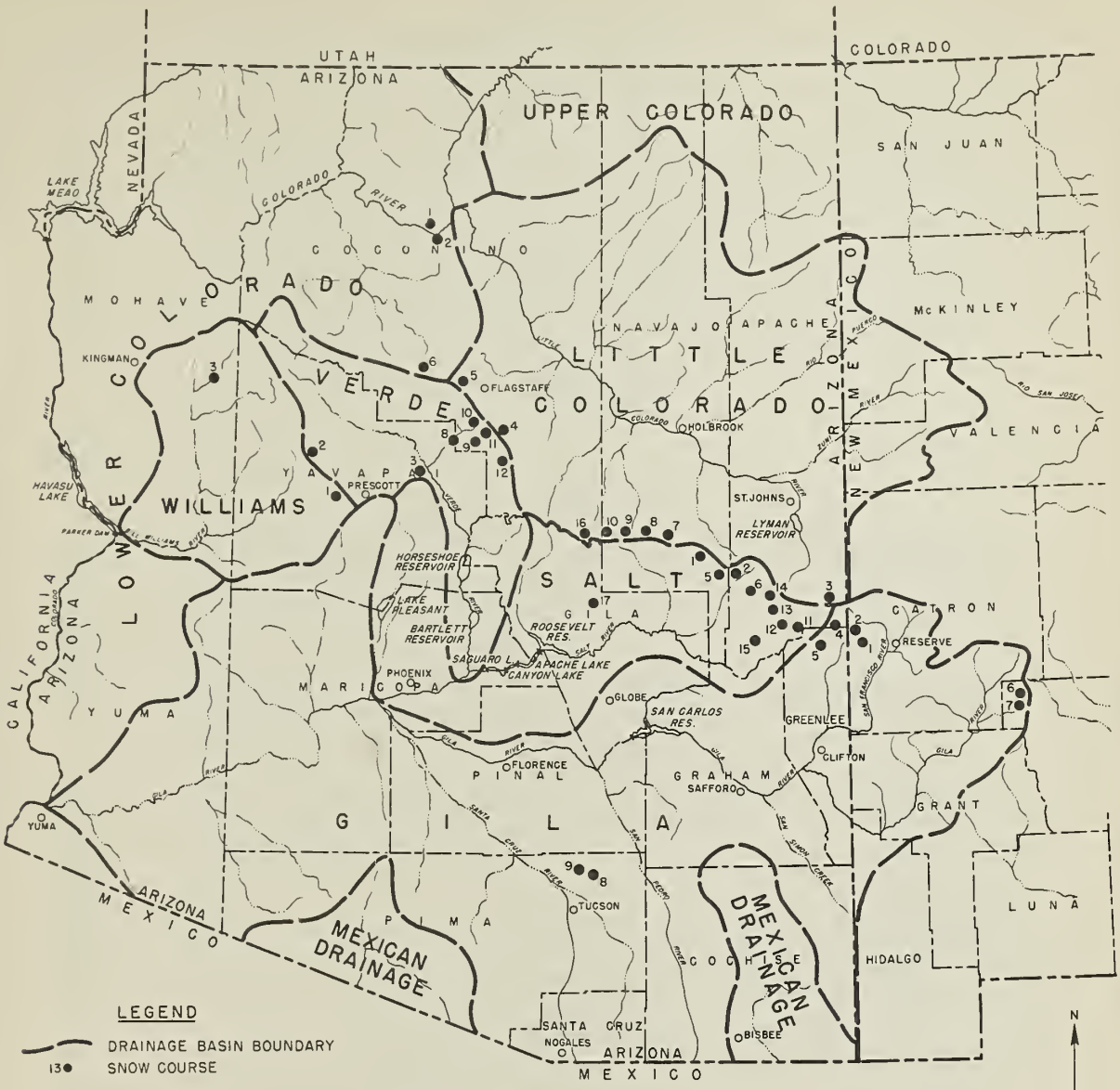



# ARIZONA
# COOPERATIVE SNOW SURVEYS

## SNOW COURSES AND DRAINAGE BASINS
## DECEMBER 1950

0 40 80 120 160 200
SCALE IN MILES



AGR-SCS-ALBUQUERQUE, N. MEX. M-178 DECEMBER 1950

INDEX TO SNOW COURSES

| NUMBER | NAME | ELEVATION |
|---|---|---|
| | **LITTLE COLORADO RIVER** | |
| 1. | Forest Dale | 6,000 |
| 2. | McNary | 7,200 |
| 3. | Nutrioso | 8,500 |
| 4. | Mormon Lake | 7,350 |
| 5. | Fort Valley | 7,350 |
| 7. | Gentry | 7,600 |
| 8. | Heber | 7,600 |
| 9. | Canyon Creek | 7,500 |
| 10. | Elk | 7,600 |
| 11. | Mormon Mountain | 7,500 |
| 12. | Happy Jack | 7,630 |
| 16. | Woods Canyon | 7,640 |
| | **WILLIAMS RIVER** | |
| 1. | Iron Springs | 6,200 |
| 2. | Camp Wood | 5,700 |
| 3. | Willow Ranch | 5,000 |
| | **GILA RIVER** | |
| 1. | Frisco Divide (N.M.) | 8,000 |
| 2. | State Line (N.M.) | 8,000 |
| 3. | Nutrioso | 8,500 |
| 4. | Coronado Trail | 8,000 |
| 5. | Beaver Head | 8,000 |
| 6. | Taylor Creek (N.M.) | 7,850 |
| 7. | Inman (N.M.) | 7,800 |
| 8. | Rose Canyon | 7,300 |
| 9. | Bear Wallow | 8,100 |
| | **VERDE RIVER** | |
| 1. | Iron Springs | 6,200 |
| 2. | Camp Wood | 5,700 |
| 3. | Mingus Mountain | 7,100 |
| 4. | Morman Lake | 7,350 |
| 5. | Fort Valley | 7,350 |
| 6. | Chalender | 7,100 |
| 8. | Munds Park | 6,500 |
| 9. | Casner Park | 6,930 |
| 10. | Antelope Park | 7,300 |
| 11. | Mormon Mountain | 7,500 |
| 12. | Happy Jack | 7,630 |
| | **SALT RIVER** | |
| 1. | Forest Dale | 6,000 |
| 2. | McNary | 7,200 |
| 3. | Nutrioso | 8,500 |
| 4. | Coronado Trail | 8,000 |
| 5. | Milk Ranch | 7,000 |
| 6. | McKay | 8,250 |
| 7. | Gentry | 7,600 |
| 8. | Heber | 7,600 |
| 9. | Canyon Creek | 7,500 |
| 10. | Elk | 7,600 |
| 11. | Big Lake Knoll | 8,800 |
| 12. | Maverick Fork | 9,050 |
| 13. | Baldy | 9,000 |
| 14. | Ft. Apache | 9,160 |
| 15. | Pacheta | 7,800 |
| 16. | Woods Canyon | 7,640 |
| 17. | Parker Creek | 5,500 |
| | **LOWER COLORADO RIVER** | |
| 1. | Bright Angel | 8,400 |
| 2. | Grand Canyon | 7,500 |
| 5. | Fort Valley | 7,350 |
| 6. | Chalender | 7,100 |

# WATER SUPPLY OUTLOOK

Arizona

February 15, 1951

* * * * * * * * * * * * * * * * * * * * * * * *
* February 15, 1951 snow surveys show *
* that practically all the snow is gone *
* from the watersheds of the State be- *
* low 8,500 feet. The snow cover of 2 *
* weeks ago has disappeared with no run-*
* off resulting. Stream flows are drop-*
* ping and soils are drying. *
*** * * * * * * * * * * * * * * * * * * * *

Precipitation. Below normal precipitation has occurred throughout the State the last month. Due to poor soil moisture conditions, much of the water has been taken in by the soil. Those soils that have been fair in soil moisture are now drying out rapidly.

Snow Cover. There are only scattered drifts of snow remaining on the Verde River watershed. Normally, there should be a cover containing 4 inches of snow-stored water. Last year at this time there was 2.7 inches of snow-stored water on the Verde drainage. No runoff of any consequence will result from the little snow remaining.

There is no snow of any measurable amounts remaining on the Salt River drainage below 8,500 feet. Soil moisture conditions under the remaining snow cover are poor. The two and a half feet of snow that covered the Mogollon Rim two weeks ago has vanished with no runoff resulting. Soil moisture conditions are only fair on the lower elevations of the Salt River drainage.

The snow-stored water on the Gila River watershed is 15 percent of normal. The snow remaining on the watershed is present in dry, scattered drifts. Soil moisture conditions are poor so that very little runoff will result from the present snow cover.

Except for scattered drifts, the snow cover is gone from the Little Colorado drainage. Normally there should be over 3.5 inches of snow-stored water on the watershed at this date. The Williams River watershed is bare of snow.

The Grand Canyon course reports no snow at the South Rim, and only 14 inches at the North Rim. Soil moisture conditions are poor.

Runoff: Runoff during the past month has been far below normal. The stream flow of the Salt and Verde Rivers has been dropping steadily since the first of the month. Practically no runoff resulted from the snow cover that has vanished. Runoff from the little snow remaining at this date will be negligible.

Runoff from the Gila River has been very poor, as has that from the Agua Fria. Both reservoirs on these rivers, for practical purposes, are dry.

Reservoir Storage. On this date, the major reservoirs of the State are storing about 14 percent of capacity, and 27 percent of a 10-year normal. They contain about 35 percent of last year's storage. The San Carlos reservoir behind Coolidge Dam, with a capacity of 1.2 million acre feet, has no usable storage. Its normal storage for this date is about 230,000 acre feet. Lake Mead is storing 62 percent of capacity, Lake Havasu contains 621,000 acre feet, and Lake Mohave has 1,402,000 acre feet.

TABLE I

ARIZONA SNOW SURVEYS FEBRUARY 15, 1951

| LOCATION | | | | | | | SNOW COVER MEASUREMENTS | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Water Content (Inches) | | | Past Record | |
| DRAINAGE BASIN and SNOW COURSE | Number | Sec. | Twp. | Rge. | Elev. | Date of Survey | Snow Depth (Inches) | 1951 | 1950 | 1949 | Years of Record | Av. Water Content (Inches) |
| LITTLE COLORADO RIVER | | | | | | | | | | | | |
| Forest Dale | 1 | 2 | 9N | 21E | 6000 | 2/15 | 0.0 | 0.0 | 0.2 | 5.0 | 11 | 1.1 |
| McNary | 2 | 14 | 8N | 23E | 7200 | 2/15 | T | T | 1.9 | 7.8 | 11 | 3.0 |
| Nutrioso | 3 | 23 | 6N | 30E | 8500 | 2/15 | 0.9 | 0.2 | 0.5 | 9.1 | 11 | 2.7 |
| Mormon Lake | 4 | 13 | 18N | 8E | 7350 | 2/16 | 0.0 | 0.0 | 3.9 | 22.3 | 4 | 8.7 |
| Fort Valley | 5 | 22 | 22N | 6E | 7350 | 2/15 | 0.0 | 0.0 | 2.0 | 11.6 | 4 | 3.4 |
| Gentry | 7 | 36 | 11N | 15E | 7600 | 2/15 | T | T | 3.7 | New Course | | |
| Heber | 8 | 28 | 11N | 15E | 7600 | 2/15 | T | T | 3.4 | New Course | | |
| Canyon Creek | 9 | 18 | 11N | 15E | 7500 | 2/15 | T | T | 4.4 | New Course | | |
| Elk | 10 | 31 | 11N | 14E | 7600 | 2/15 | T | T | 5.2 | New Course | | |
| Mormon Mt. | 11 | 14 | 18N | 8E | 7500 | 2/16 | T | T | 6.3 | New Course | | |
| Happy Jack | 12 | 30 | 17N | 9E | 7630 | 2/16 | 0.0 | 0.0 | New Course | | | |
| Average | | | | | | | T | T | 3.2 | 11.1 | | 3.78 |
| GILA RIVER | | | | | | | | | | | | |
| Frisco Divide | 1 | 31 | 6S | 20W | 8000 | 2/15 | 2.6 | 0.6 | 0.7 | 6.3 | 11 | 2.3 |
| State Line | 2 | 6 | 6S | 21W | 8000 | 2/15 | 1.0 | 0.2 | 0.5 | 8.1 | 11 | 3.3 |
| Nutrioso | 3 | 23 | 6N | 30E | 8500 | 2/15 | 0.9 | 0.2 | 0.5 | 9.1 | 11 | 2.7 |
| Coronado Trail | 4 | 26 | 5N | 30E | 8000 | 2/15 | 0.0 | 0.0 | 0.5 | 12.4 | 11 | 4.1 |
| Beaver Head | 5 | 13 | 4N | 30E | 8000 | 2/15 | 0.0 | 0.0 | 0.4 | 10.1 | 10 | 3.6 |
| Taylor Creek | 6 | 20 | 10S | 10W | 7850 | 2/15 | 2.9 | 1.0 | N.R. | 2.1 | 9 | 0.6 |
| Inman | 7 | 6 | 11S | 10W | 7800 | 2/15 | 3.4 | 1.1 | N.R. | 1.9 | 5 | 0.9 |
| Rose Canyon | 8 | 15 | 12S | 16E | 7300 | 2/15 | 0.0 | 0.0 | 0.8 | 4.2 | 3 | 2.2 |
| Bear Wallow | 9 | 6 | 12S | 16E | 8100 | 2/15 | 1.1 | 0.4 | 2.2 | 7.9 | 3 | 4.1 |
| Average | | | | | | | 1.3 | 0.4 | 0.8 | 7.0 | | 2.64 |

TABLE I

ARIZONA SNOW SURVEYS FEBRUARY 15, 1951

| LOCATION | | | | | | SNOW COVER MEASUREMENTS | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | Water Content (Inches) | | | Past Record | |
| DRAINAGE BASIN AND SNOW COURSE | Number | Sec. | Twp. | Rge. | Elev. | Date of Survey | Snow Depth (Inches) | 1951 | 1950 | 1949 | Years of Record | Av. Water Content (Inches) |
| WILLIAMS RIVER | | | | | | | | | | | | |
| Iron Springs | 1 | 22 | 14N | 3W | 6200 | 2/12 | 0.0 | 0.0 | 0.0 | 10.9 | 5. | 2.3 |
| Camp Wood | 2 | 3 | 16N | 6W | 5700 | 2/15 | 0.0 | 0.0 | 0.0 | 8.3 | 5 | 1.8 |
| Willow Ranch | 3 | 16 | 21N | 11W | 5000 | 2/15 | 0.0 | 0.0 | 0.0 | 4.3 | 5 | 0.9 |
| Average | | | | | | | 0.0 | 0.0 | 0.0 | 7.8 | | 1.6 |
| SALT RIVER | | | | | | | | | | | | |
| Forest Dale | 1 | 2 | 9N | 21E | 6000 | 2/15 | 0.0 | 0.0 | 0.2 | 5.0 | 11 | 1.1 |
| McNary | 2 | 14 | 8N | 23E | 7200 | 2/15 | T | T | 1.9 | 7.8 | 11 | 3.0 |
| Nutrioso | 3 | 23 | 6N | 30E | 8500 | 2/15 | 0.9 | 0.2 | 0.5 | 9.1 | 11 | 2.7 |
| Coronado Trail | 4 | 26 | 5N | 30E | 8000 | 2/15 | 0.0 | 0.0 | 0.5 | 12.4 | 11 | 4.1 |
| Milk Ranch | 5 | 28 | 8N | 23E | 7000 | 2/15 | 0.0 | 0.0 | 1.0 | 6.1 | 10 | 1.7 |
| Gentry | 7 | 36 | 11N | 15E | 7600 | 2/15 | T | T | 3.7 | New Course | | |
| Heber | 8 | 28 | 11N | 15E | 7600 | 2/15 | T | T | 3.4 | New Course | | |
| Canyon Creek | 9 | 18 | 11N | 15E | 7500 | 2/15 | T | T | 4.4 | New Course | | |
| Elk | 10 | 31 | 11N | 14E | 7600 | 2/15 | T | T | 5.2 | New Course | | |
| Big Lake Knoll | 11 | 2 | 5N | 28E | 8800 | No Survey | | | 5.5 | New Course | | |
| Maverick Fork | 12 | 13 | 6N | 27E | 9050 | 2/14 | 9.3 | 3.0 | 6.8 | New Course | | |
| Baldy | 13 | 28 | 7N | 27E | 9000 | 2/14 | 12.3 | 3.0 | 3.9 | New Course | | |
| Ft. Apache | 14 | 18 | 7N | 27E | 9000 | 2/14 | 14.4 | 3.5 | 2.9 | New Course | | |
| Pacheta | 15 | | | | 7800 | 2/15 | 0.0 | 0.0 | 0.8 | New Course | | |
| Average | | | | | | | 3.1 | 0.7 | 2.8 | 8.3 | | 2.5 |

TABLE I

ARIZONA SNOW SURVEYS FEBRUARY 15, 1951

| DRAINAGE BASIN and SNOW COURSE | LOCATION Number | Sec. | Twp. | Rge. | Elev. | Date of Survey | Snow Depth (Inches) | SNOW COVER MEASUREMENTS Water Content (Inches) 1951 | 1950 | 1949 | Past Record Years of Record | Av. Water Content (Inches) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| VERDE RIVER | | | | | | | | | | | | |
| Iron Springs | 1 | 22 | 14N | 3W | 6200 | 2/12 | 0.0 | 0.0 | 0.0 | 10.9 | 5 | 2.3 |
| Camp Wood | 2 | 3 | 16N | 6W | 5700 | 2/15 | 0.0 | 0.0 | 0.0 | 8.3 | 5 | 1.8 |
| Mingus Mt. | 3 | 3 | 15N | 2E | 7100 | 2/15 | 0.0 | 0.0 | T | 10.8 | 4 | 2.8 |
| Mormon Lake | 4 | 13 | 18N | 8E | 7350 | 2/16 | T | T | 3.9 | 22.3 | 4 | 8.7 |
| Fort Valley | 5 | 22 | 22N | 6E | 7350 | 2/15 | 0.0 | 0.0 | 2.0 | 11.6 | 4 | 3.4 |
| Chalender | 6 | 27 | 22N | 3E | 7100 | 2/15 | 0.0 | 0.0 | 3.4 | 10.9 | 4 | 4.5 |
| Munds Park | 8 | 7 | 18N | 7E | 6500 | 2/16 | 0.0 | 0.0 | 0.0 | New Course | | |
| Casner Park | 9 | 19 | 18N | 8E | 6930 | 2/16 | 0.0 | 0.0 | 5.1 | New Course | | |
| Antelope Park | 10 | 29 | 19N | 8E | 7300 | 2/16 | 0.0 | 0.0 | 6.7 | New Course | | |
| Mormon Mt. | 11 | 14 | 18N | 8E | 7500 | 2/16 | T | T | 6.3 | New Course | | |
| Happy Jack | 12 | 30 | 17N | 9E | 7630 | 2/16 | 0.0 | 0.0 | New Course | | | |
| Average | | | | | | | T | T | 2.7 | 12.5 | | 3.92 |
| LOWER COLORADO RIVER | | | | | | | | | | | | |
| Bright Angel | 1 | 34 | 33N | 3E | 8400 | 2/15 | 14.5 | 3.7 | 4.2 | 17.9 | 3 | 12.3 |
| Grand Canyon | 2 | 21 | 30N | 4E | 7500 | 2/15 | 0.0 | 0.0 | 3.6 | 8.9 | 3 | 4.9 |
| Fort Valley | 5 | 22 | 22N | 6E | 7350 | 2/15 | 0.0 | 0.0 | 2.0 | 11.6 | 4 | 3.4 |
| Chalender | 6 | 27 | 22N | 3E | 7100 | 2/15 | 0.0 | 0.0 | 3.4 | 10.9 | 4 | 4.5 |
| Average | | | | | | | 3.5 | 1.2 | 3.3 | 12.3 | | 6.28 |

TABLE 2

STATUS OF RESERVOIR STORAGE, February 15, 1951

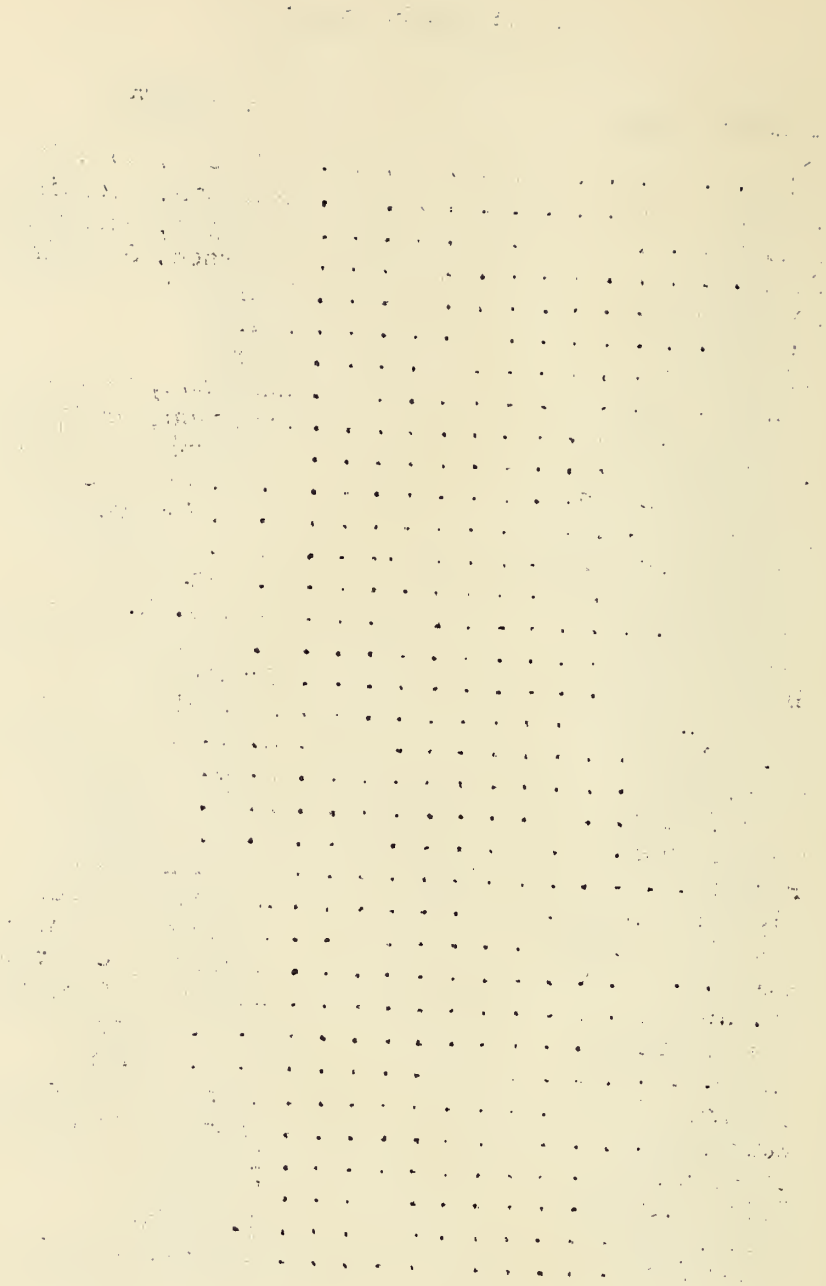
| BASIN and STREAM | RESERVOIR | USABLE CAPACITY (1000 A.F.) | THOUSANDS ACRE FEET IN STORAGE About Feb.15 | | | | |
|---|---|---|---|---|---|---|---|
| | | | 1951 | 1950 | 1949 | 1948 | 10 yr. Avg. 1940-49 |
| Agua Fria | Lake Pleasant | 179 | 0 | 6 | 18 | 1 | 19 |
| Colorado | Lake Mohave | 1,810 | 1,402 | New Dam | | | |
| Colorado | Lake Havasu | 688 | 621 | 625 | 572 | 583 | 547 |
| Colorado | Lake Mead | 27,935 | 17,434 | 18,571 | 18,563 | 19,448 | 19,709 |
| Gila | San Carlos | 1,200 | 0 | 94 | 162 | 1 | 232 |
| Verde | Bartlett | 179 | 9 | 45 | 90 | 3 | 51[a] |
| Verde | Horseshoe | 67 | 2 | 11 | 5 | 11 | 10[b] |
| Salt | Roosevelt | 1,382 | 4 | 318 | 174 | 34 | 511 |
| Salt | Apache | 245 | 170 | 228 | 107 | 158 | 179 |
| Salt | Canyon | 58 | 49 | 34 | 23 | 20 | 30 |
| Salt | Saguaro | 70 | 47 | 22 | 26 | 20 | 19 |

a - Average for years 1941 through 1949

b - Average for years 1946 through 1949

## LIST OF SNOW SURVEYORS

| SNOW COURSE | SURVEYOR |
|---|---|
| Elk | Anderson, Goodwin |
| Canyon Creek | Anderson, Goodwin |
| Gentry | Anderson, Goodwin |
| Heber | Anderson, Goodwin |
| Forest Dale | Fair |
| McNary | Fair |
| Milk Ranch | Fair |
| Casner Park | Anderson, Greaves |
| Munds Park | Anderson, Greaves |
| Antelope Park | Anderson, Greaves |
| Mormon Mountain | M. F. Greaves |
| Mormon Lake | M. F. Greaves |
| Mingus Mountain | M. F. Jones |
| Iron Springs | E. Saxby |
| Camp Wood | Mrs. C. C. Merritt |
| Willow Ranch | T. Miller |
| Grand Canyon | Schuft |
| Bright Angel | Patrick, Patrick |
| Ft. Valley | A. P. Loska |
| Chalender | M. C. Oleson |
| Bear Wallow | W. H. Hughes |
| Rose Canyon | W. H. Hughes |
| Pacheta | F. Phillips |
| Big Lake Knoll | Anderson, Goodwin |
| Maverick Fork | Anderson, Goodwin |
| Baldy | Anderson, Goodwin |
| Ft. Apache | Anderson, Goodwin |
| Taylor Creek | F. M. Inman |
| Inman | F. M. Inman |
| Coronado Trail | Shumate, Cassanova |
| Nutrioso | Shumate, Cassanova |
| State Line | Liedman |
| Frisco Divide | Liedman |
| Beaver Head | J. Burke |
| Happy Jack | Ryberg, Goodwin |



The following organizations cooperate in the Arizona snow survey work:

FEDERAL

Department of Agriculture
- Forest Service
  - Apache Forest
  - Coconino Forest
  - Coronado Forest
  - Gila Forest
  - Kaibab Forest
  - Prescott Forest
  - Sitgreaves Forest
  - Southwestern Forest and Range Experiment Station, Fort Valley, Arizona
  - Sierra Ancha Experiment Forest Station
- Soil Conservation Service
  - Division of Irrigation

Department of Commerce
- Weather Bureau
  - Arizona Section

Department of Interior
- Bureau of Reclamation
  - Region III
- Geological Survey
  - Arizona District
- Indian Service
  - Fort Apache Reservation
- National Park Service
  - Grand Canyon National Park

Gila Water Commissioner
Safford, Arizona

IRRIGATION PROJECTS

Salt River Valley Water Users Association, Phoenix, Arizona

San Carlos Irrigation and Drainage District, Coolidge, Arizona

Southwest Lumber Mills, Inc., McNary, Arizona

Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

Federal - State - Private

COOPERATIVE SNOW SURVEYS

—

Furnishes the basic data necessary for forecasting water supply for irrigation, domestic and municipal water supply, hydro-electric power generation, navigation, mining and industry

"WATER IS THE WEST'S GREATEST RESOURCE"